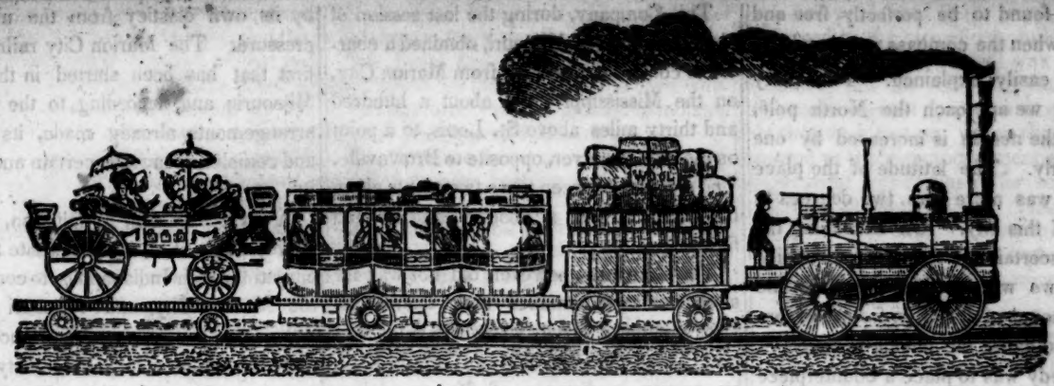

AMERICAN RAILROAD JOURNAL,
AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, APRIL 15, 1837. [VOLUME VI—No 15.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, APRIL 15, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America*.

TO RAILROAD CONTRACTORS.

SEALED proposals will be received at the office of the Selma and Tennessee River Railroad Company, in the town of Selma, Alabama, for the graduation of the first forty miles of the Selma and Tennessee Railroad. Proposals for the first six miles from Selma, will be received after the first of May, and acted on by the Board on the 15th May. Proposals for the ensuing 34 miles, will be received after the 10th May, but will not be examined until the 1st of August next, when the work will be ready for contract.

The line, after the first few miles, pursuing the flat of the Mulberry Creek, occupies a region of country, having the repute of being highly healthful. It is free from ponds and swamps, and is well watered.—The soil is generally in cultivation, and is dry, light and sandy, and uncommonly easy of excavation.—The entire length of the line of the Selma and Tennessee Railroads, will be about 170 miles, passing generally through a region as favorable for health as any in the Southern Country.

Owing to the great interest at stake in the success of this enterprise, and the amount of capital already embarked in it, this work must necessarily proceed with vigor, and I invite the attention of men of industry and enterprise, both at the North and elsewhere to this undertaking, as offering in the prospect of continued employment, and the character of the soil and climate, a wide and desirable field to the contractor.

Proposals may be addressed either to the subscriber, or to General Gilbert Shearer, President of the Company.

ANDREW ALFRED DEXTER, Chief Engineer.
Selma, Ala., March 20th, 1837. A 15 tf

GREAT WESTERN RAILWAY THROUGH CANADA AND MICHIGAN.

We have been furnished with documents in relation to these roads, from which we shall make several extracts for our next number. They go to establish the route as laid down in the Report, published in No 7, or 18th February, of this Journal.

CANAL BOAT EXPERIMENTS.—In this number of the Journal will be found a continuation of the article on Canal Boat Experiments, which was commenced in our last.

These experiments were made by John Mac Niell, Esq., and published in the 1st Volume of the "Transactions of the Institution of Civil Engineers" of Great Britain, a work of great value, which we are now republishing in the Journal, and also in *Numbers*, with all the engravings neatly done on wood.

This article will be found highly interesting and valuable to many of our readers at the present period, when the enlargement of the *Erie*, and the construction of numerous other canals occupies so much attention; and we therefore ask for it particular attention; and also at the same time request those, who may appreciate its value to give us their aid in *extending the circulation of the Journal*. The additional cost of publishing the Journal this year, in consequence of *republishing* the "*Transactions*" will be several hundred dollars, and we look to its friends, in different parts of the country for an increased circulation.

We are indebted to Mr. Stevenson, of Edinburgh, for several Railway pamphlets. This gentleman, the son of David Stevenson, Esq., C. E., of Edinburgh, is about making a professional tour through the United States.

We commend him to the courtesy of the profession, to which he bears in his manners a sufficient passport, independent of the high testimonials from many distinguished gentlemen.

We are also indebted to A. A. Dexter, Esq., C. E., for his Report of the Montgomery Railroad Company,—to David Scott, Esq., C. E., for his Report to the board of public works of Ohio, relative to the Zanesville and Maysville Railroad, and the Chillicothe and Cincinnati Railroad; and to other friends for the annual report of the Petersburgh Railroad Company, the Lagrange and Memphis Railroad Company, and the *Texas Railroad Navigation* and *Banking* Company, all of which will receive attention in due time

MAGNETIC NEEDLE OF THE SURVEYOR'S COMPASS.

Though the principle of the directive power of the needle is well known, we believe that the following case may not be of rare occurrence, and state it for the benefit of the makers and users of instruments.

A Surveyor's Compass had been ordered which we procured and forwarded in complete order. It was returned, because when levelled by the bubbles, the needle was so much inclined as to touch the limb of the compass box

When we received the instrument, no such fault was found to exist, the needle

was again found to be perfectly free and horizontal when the compass was leveled.

This is easily explained. For every degree that we approach the North pole, the *dip* of the needle is increased by one degree nearly. The latitude of the place in question was more than two degrees to the north of this city. On examining the limb and ascertaining the space occupied by 2° 20′, we were not surprised to find that this amount of deviation from horizontality, should cause the needle to touch.

The remedy was to place a counterpiece of brass or copper wire upon the needle, the adjustment being made here. On reaching the place of destination, the north pole will again be found to dip, and this is to be prevented by moving the counterpiece until the needle is exactly balanced.

These counterpoises in one shape or other were formerly quite common, but we have recently seen a vast number of instruments without any thing of the kind.—Such a Compass, though properly adjusted while in the shop, no sooner reaches a distance of 60 miles or more, to the North or South. than the respective pole will be found to have a tendency to dip by a very considerable and unpleasant amount.

We would recommend Instrument Makers to supply this counterpoise in all instances—for we are well convinced that they are often blamed for bad workmanship, when the very power that renders the needle useful is the true cause of the difficulty.

The dip not being constant in the same place, renders this adjustment still more necessary.

It need hardly be mentioned, that the construction of an extemporaneous counterpoise, can be accomplished by any one who uses an instrument.

MARION CITY AND MISSOURI RAILROAD.—Until very recently we have heard nothing in relation to "Internal Improvements in Missouri," but present indications are highly favorable to the commencement and progress of such works, as must develope the resources of that State. We give the following a place in our columns, and solicit others on the same subject:—

INTERNAL IMPROVEMENTS IN MISSOURI.

Messrs. EDITORS:—As a portion of your readers may be interested in the improvements of the "Far West," I take the liberty of sending for insertion in the Journal, (should you deem it of sufficient importance,) the following brief account of the operations of the Marion City and Missouri Railroad Company:

This Company, during the last session of the Legislature of Missouri, obtained a charter to construct a railroad from Marion City, on the Mississippi river, about a hundred and thirty miles above St. Louis, to a point on the Missouri river, opposite to Brownville. The distance between these two points along the railroad route is about a hundred and fifty miles.

The Company, however, did not wait for a charter to commence their operations. Last summer a survey was made from Marion City to the town of New-York, in Shelby county, a distance of fifty-one miles, since which time a portion of the road has been prepared for the superstructure, and the cross sleepers delivered for seven miles of the route, from Marion City to Palmyra, and this part of the road will be completed and in operation in the course of the following summer.

Taking the whole distance of the road from Marion City to the Missouri river, the route is one of the most remarkable that has ever been surveyed. Nine-tenths of the distance may be said to require neither clearing, grubbing, nor grading. The route runs along a connected chain of prairies, from a half mile, to two, three and four miles in breadth, and the average quality of the lands adjacent to the route is not surpassed by any in Missouri.

Marion City, the terminating point of this railroad on the Mississippi, is situated on the west bank of the river, on an extensive prairie, embracing a surface of from five to six square miles. A portion of this prairie is subject occasionally to overflow during very high floods. Last spring, when the flood was at its highest mark, since 1828, the high water mark was about 18 inches below the average level of the river bank, in front of the town, a portion of the interior was overflown. In order, however, to remove the whole from danger, a levee is to be thrown up surrounding the town. The whole of the levee is now under contract, nearly one half is already thrown up, and the whole is to be completed according to the conditions of the contract by the middle of April.

Two steam saw mills are already in operation at this place, and two others, together with a steam flour mill, will be put in operation in the course of the spring and summer following. These, together with other works of a public nature, now in progress, prove that the Company have taken hold of their original plan of improvements with a gigantic hand. Attempts were made through private interests to throw the dead weight of detraction on the character of these improvements; but it has recovered by its own elasticy from the momentary pressure. The Marion City railroad is the first that has been started in the State of Missouri; and, according to the extensive arrangements already made, its progress and completion must be certain and successful.

A project is now in agitation, to have a survey made of a railroad route from Cincinnati through Indianapolis, to connect with the Marion City and Missouri railroad. Should this plan of a railroad succeed, and there is no doubt of its practicability, it would form a continuation of the *Charleston* and *Cincinnati* railroad. There would then be a continuous line of railroad from Charleston to Brownville on the Missouri river; besides there is now in contemplation the project of a railroad from Boonville, westward to some convenient point on the western boundary of Missouri, for the purpose of embracing the Santa Fe trade. A more splendid system of railroad communication, could not be devised through any portion of the United States. Such is the rapid progress of internal improvements, that in ten years this project may be realized. T.

March 10, 1837.

We commend the following article from the Courier and Enquirer to the attention of all who feel an interest in the progress of internal improvement in this State or Union.

Enlargement of the Erie Canal.—We are pleased to perceive that this subject is exciting the attention of this city and elsewhere, which its intrinsic importance so imperiously demands. But more especially is this a measure in which the city of New-York is directly interested to a greater extent than even the western counties of this State. All who are familiar with the growth and prosperity of our city during the last thirty years, are well aware that its greatest advancement has taken place since the opening of the Erie canal in 1824, and that in point of fact we may date our extraordinary and rapid increase in wealth and population from that period. The completion of the great work, opened a new world for enterprise and industry, the product of which was emptied into this city and gave new life and vigor to every branch of business. It not only enabled us to command the resources of the western part of this State, but it gave a new value to all the country bordering on the Lakes, and induced hundred of thousands to resort to that region under the conviction that through the medium of our Erie Canal they could always reach the market and avail themselves of its advantages. In short its value to us is absolutely incalculable, at the same time that it has actually caused a whole empire laying on our north-western waters, to spring into existence with a degree of rapidity that is almost incomprehensible, and which appears to have been the work of enchantment.

In consequence of this wonderful increase in the population of the north-west, and the inexhaustable agricultural wealth of that region, the great object of the Erie canal is about to be in a measure frustrated by its want of capacity to do the business, which the fertility of soil and untiring industry and enterprise of the west already presents. In point of fact, the canal at this moment cannot transport to market the produce of the country which depends upon it as the only permanent avenue to the ocean; and if such be the case now, when the western emigrant is in a measure consuming what is raised in that country,—what will it be in five years from this time, when the whole of that region will be under cultivation, and its annual product for exportation be equal to the whole produce of the grain growing States of the Union at this day? We need not answer. The produce must and will find a market somewhere and when it cannot reach the best, it must of necessity, be diverted to some other. From our position, the immense amount of our exports, the activity, energy, and enterprise of our people, New-York must ever be the great commercial emporium of the United States, unless facilities are afforded for getting to another market in less time and at less expense. If we will not take the necessary measures to bring the produce of the country where nature designed it should come, but compel it to go to Philadelphia or Baltimore, it follows of course, that the merchants must send that produce abroad, and bring back the avails in imports. Thus it is possible, that by neglecting to do our duty, we may to a certain extent, counteract the benificent designs of Nature in our behalf; and it is to this bearing of the snbject, that we would call the attention of every member of the Legislature, and every thinking man in this community.

It is the solemn and the sacred duty of our Legislature to act promptly and definitively on this question. Of course they should not waste the people's money; but at any and every cost, they should enlarge the Erie canal within the shortest practicable period, even if it should cost double the sum to accomplish it in *three* that it would in *six* years. The whole cost of such enlargement, be it what it may, is a mere drop in the bucket, compared with the certain and irreparable consequences of suffering the Western trade to be diverted from this city for a single season. It must not, if we can avoid it, ever be permitted to find any other avenue to the ocean than through our port, and in all our legislation, this great object should never be lost sight of, by those to whom the people entrust the guardianship of their best interests.

A friend handed us a few days since, a memorandum, setting forth the necessity of enlarging the Erie Canal, which he intended as a kind of text book for ourselves in alluding to this subject; but it is so well condensed that we give it to our readers as exhibiting in very few words, the whole merits of the contemplated improvement.

"The Erie Canal is too small for the present business in the most *busy* times of the year."

Its business has rapidly increased, and will increase more rapidly.

1st. From the increase amount of produce raised by the millions who have within the last three years, emigrated to Indiana, Illinois, Michigan and Missouri.

2d. From the numerous channels of communication now opening with Lake Erie, viz:

The Wabash and Erie canal, connecting the navigable waters of Wabash with Lake Erie. It runs through a rich and well settled country, and will bring an immense amount of property into Lake Erie, which now goes to New-Orleans or to Baltimore; (will be done in less than three years.)

2. Mad River and Lake Erie Railroad; (almost completed.)

3. Illinois and Michigan Canal, from the steamboat navigation on the Illinois river, to Lake Michigan, at Chicago.

4. Improved navigation of the Fox and Wisconsin rivers.

5. Erie and Kalamezoo Railroad, and a great number of Railroads to the interior of Michigan, Indiana, Illinois, &c.

The natural increase of business *without* the opening of these new channels, will choke up the canal in four years—when they are opened, the canal can do little more than half the business offering unless enlarged. When the business becomes so large as to impede the progress of boats in the canal, a part, (and not a small part) will find its way to Philadelphia. Pennsylvania, in anticipation of this, is opening numerous channels of communication between the Lake and Philadelphia—*as follows:*

1st. The Mahoming canal, connecting the Ohio and Pennsylvania canals, from Arkansas to New Castle. Through this canal in *nine months a canal-boat can go from Cleveland on Lake Erie to Pittsburg.* From Cleveland to Philadelphia, the distance by this route, is 160 miles less than to New-York by the Erie canal.

2. The Western section of the Pennsylvania Canal to Erie, will be completed in two years.

3. The Erie and Philadelphia Railroad through Northumberland. The most wealthy men in Philadelphia, with *Nicholas Biddle* at their head, are interested in this work, and it will be made as fast as money can make it. It will be 100 miles nearer than the New-York and Erie Railroad.

4. The Conneaut and Beaver Railroad, from Lake Erie to Beaver and Pittsburg, will be done in two years.

5. The Cleveland and Pittsburg road; in three or four years.

These will *all* be completed before the canal can be enlarged. As soon as the business of the canal is obstructed, it will go off to Philadelphia in these channels—and when once diverted, it may be difficult to get it back again."

NOVEL EXPERIMENTS ON RAILWAYS.—Since the opening of the Durham and Sunderland Railway, a novel experiment has been tried upon the line, which proves the practicability of railroad vehicles being propelled by wind. A temporary mast and sail were erected on a vehicle, which was set going at an easy rate. On the sail being trimmed to the wind, the speed increased to the rate of ten miles an hour. A train of five coal wagons was afterwards attached, but no additional sail hoisted. The train was set going as easy as possible to give it motion, when the speed increased to the rate above mentioned. The experiment was repeated for several days between Sunderland and Hendon, each way, with the same success, and was witnessed by numbers of spectators, who were much delighted with the novelty of the scene.—[Mining Jour.]

THE NEW VEHICLE RETARDER.—Much curiosity has been excited in Oxford by repeated trials of a new invention intended to regulate the speed of carriages when descending a hill, by means of which the coachman can instamly or progressively lock both the hind wheels. The apparatus was applied to a four-horse stage, which was loaded with passengers, and, on ascending or descending a hill, was found to answer all the purposes intended. The inventor then proposed that the coach should be taken down the hill without horses, and it was frequently stopped while proceeding at the rate of twelve miles an hour. Many practical gentlemen had ample proofs of the principle of the invention by having the coach lifted up, and the two hind wheels allowed to turn free on the axle, when it was found that a two-pound weight, placed on the extremity of the wheel, would gently bring it round; but when the first degree of retarding power was applied, it took a weight, so placed, of fifteen pounds to bring it gently round; the second degree, thirty-six pounds; the third degree, fifty-six pounds; and the fourth degree, three quarters of a hundred; but with this weight no one person was capable of moving either wheel on its axle. Mr. B. Pearson, organist of the city church, is the inventor.—[Oxford paper.]

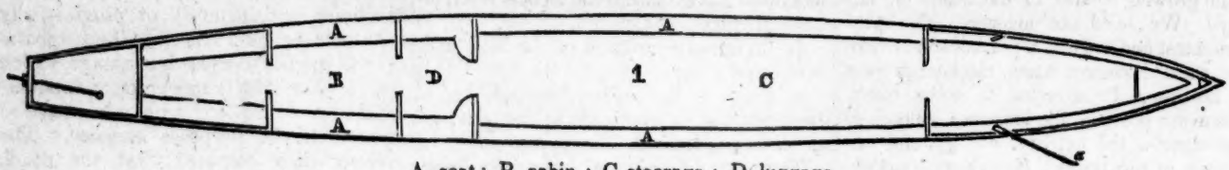
TO PREVENT MILK FROM TURNING SOUR.—Add to each quart of milk about 10 grains of bi carbonate of soda. It does not injure the taste of the milk, and aids remarkably the digestion of it. One of the large milk establishments of Paris has no other means of keeping the milk which remains, an advantage which is highly appreciated in large concerns of the kind.—[Jour. de Connais, Usuelles.]

IRRADIATION OF LIGHT.—It is a curious fact, that if the same letters of the same size precisely are painted on two boards, the one white on a black ground, and the other black on a white ground, that the white letters will appear larger, and be read at a greater distance, than the black. This is owing to what is called the irradiation of light. It depends on this, that the impression made on the bottom of the eye by bright objects extends a little wider than the actual portion of the organ struck by the light, and invading the space occupied by the darker objects, makes the brighter appear larger than they really are. —[Railway Mag.]

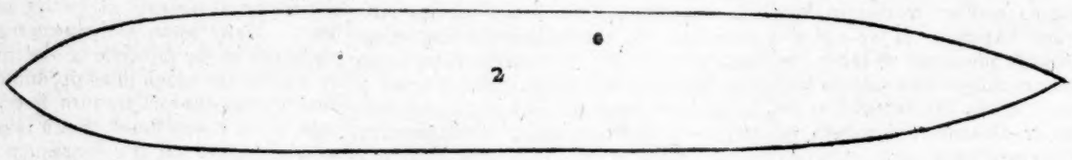
TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGIFEERS.

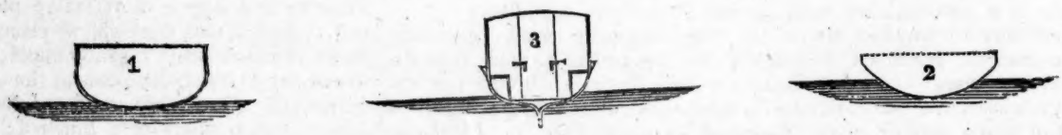
Plate 1.

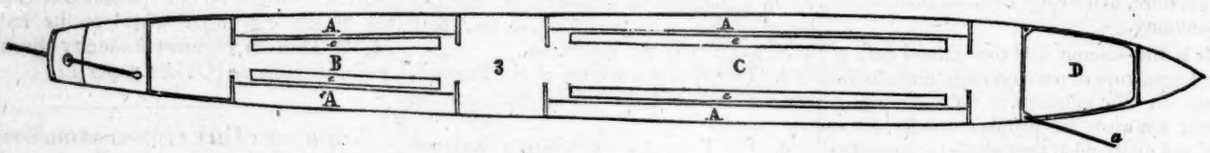
PLANS.—1, Eagle; 1, Hawk; 2, Velocity; 3, Rapid; 4, Zephyr; 5, Lark. SECTIONS.—2, Velocity; 3, Rapid; 1, Eagle; 1, Hawk. ELEVATION.—1, Eagle; 1, Hawk. *a*, towing line.

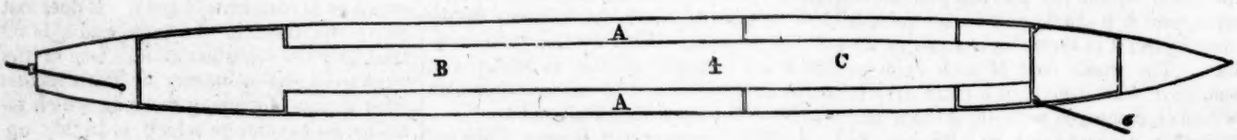


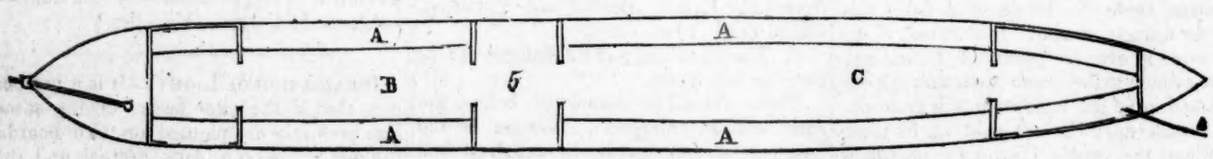
A, seat; B, cabin; C, steerage; D, luggage.









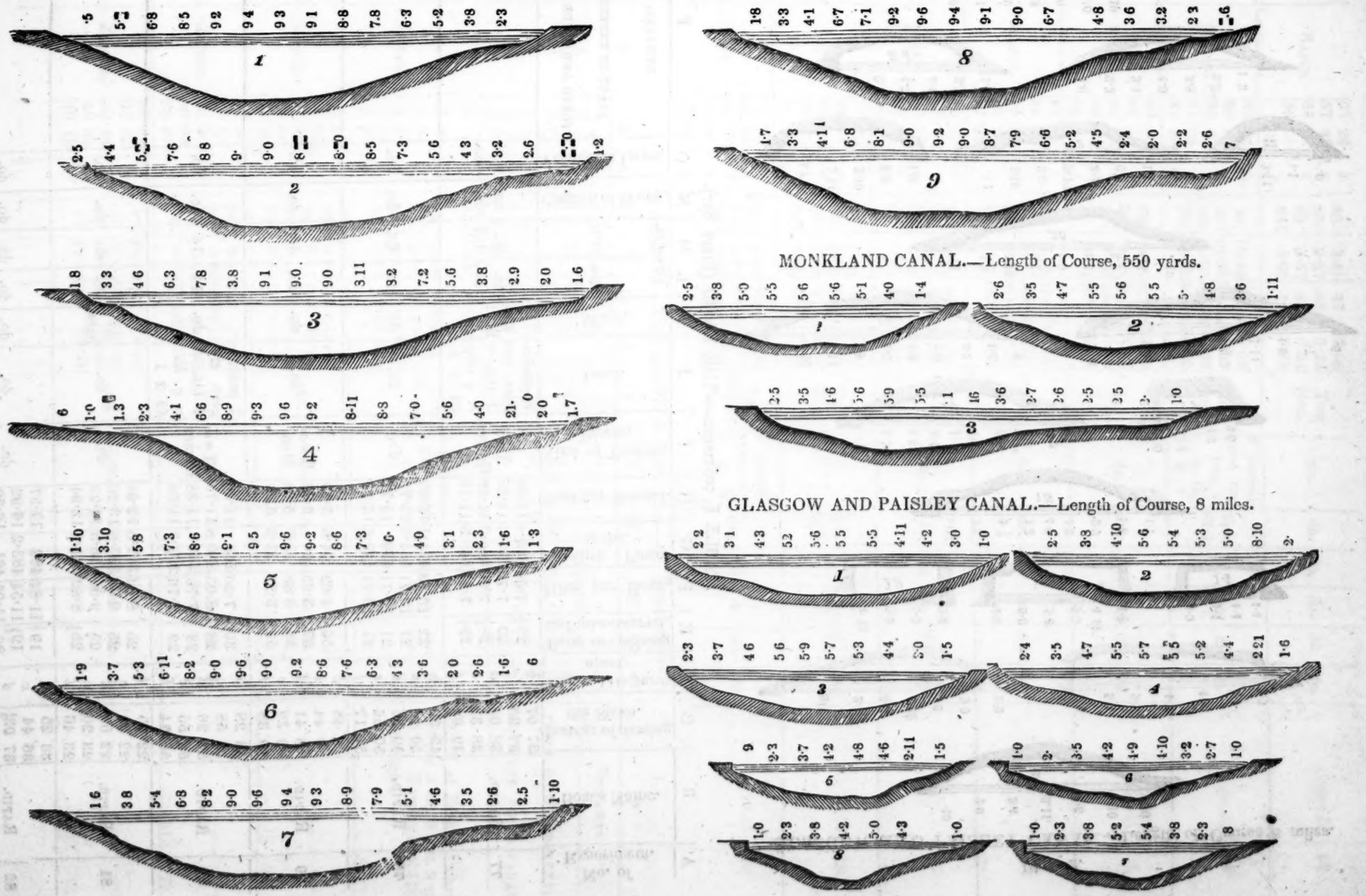


3.—A, seat; B, cabin; C, steerage; D, luggage; *e*, table. 4.—A, seat; B, steerage; C, cabin. 5.—A, seat; B cabin; C, steerage.

Transverse Sections of the Canals, taken within the limits of the Courses.

Plate 2.

FORTH AND CLYDE CANAL.—Length of course, 550 yards.



MONKLAND CANAL.—Length of Course, 550 yards.

GLASGOW AND PAISLEY CANAL.—Length of Course, 8 miles.

Plate 2.

GLASGOW AND PAISLEY CANAL.—Length of Course 8 miles.

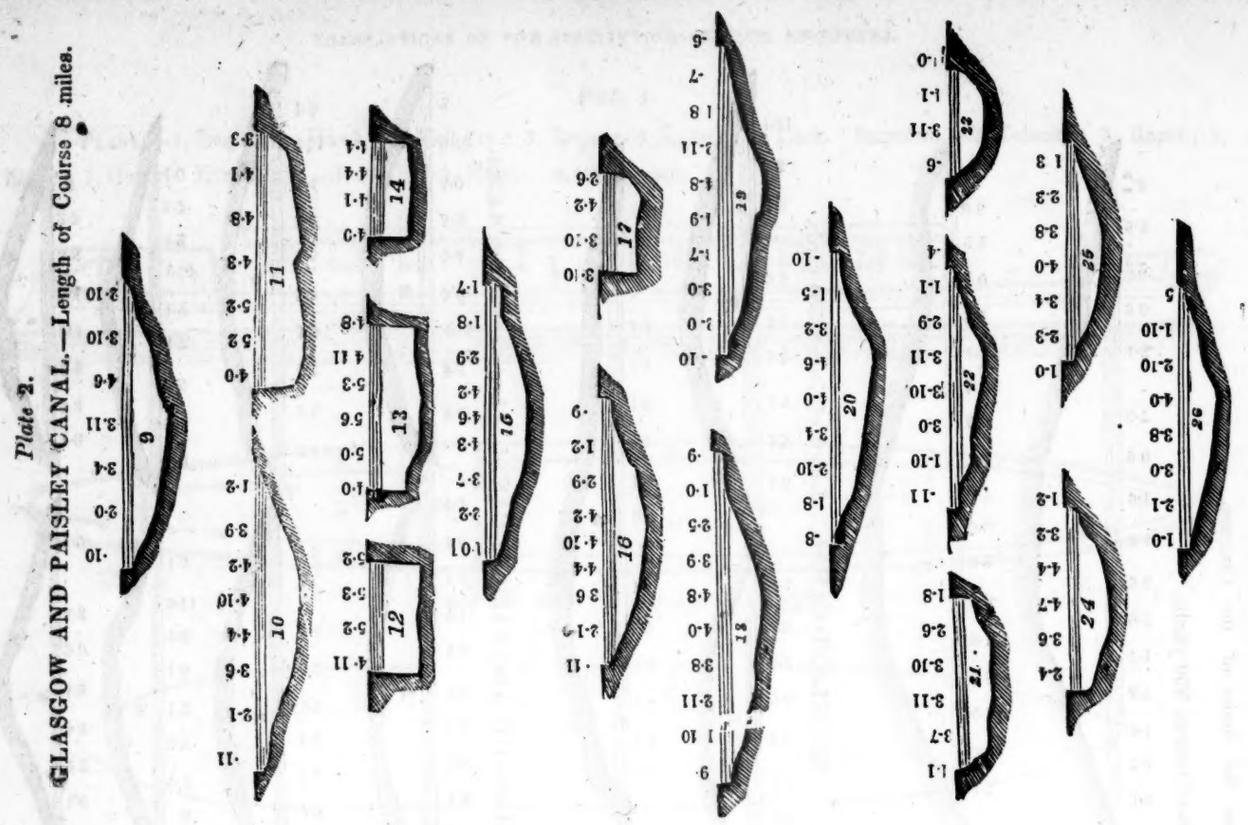


TABLE I. CONTINUED.—THE RAPID (FIRST SET).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's Name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the Stake-intervals.	Miles per Hour.	Tractive Power in lbs.	Feet per Second.	Kind of Tractive Power.	Load.	Wind.	Draught. Bow	Draught. St'rn	Position of Wave.	Variation in Level.	REMARKS. PLACE OF EXPERIMENT. FORTH AND CLYDE CANAL.
77	RAPID.	37 07	*b*					Two Horses.	7 passengers, and 3 ton, = *c. q. lb.* 69 2 1	unf. light	in. $15\frac{7}{8}$	in. $15\frac{3}{8}$	not obs.	not obs.	
		37 35½	*c*	28½	7·90	319·4	11·58								
		38 04½	*d*	29	7·76	307·4	11·38								
		38 33	*e*	28½	7·90	346·3	11·58								
		39 02½	*f*	29½	7·59	348·8	11·19								
78	RAPID.	49 52	*b*					do.	do.	do.	do.	do.	do.	do.	
		50 14	*c*	22	10·23	474·1	15·00								
		50 35	*d*	21	10·71	454·5	15·71								
		50 56	*e*	21	10·71	438	15·71								
		51 17	*f*	21	10·71	449·6	15·71								
79	RAPID.	6 48	*b*					Two Men	do.	do.	do.	do.	do.	do.	
		7 44	*c*	56	4·02	64·6	5·89								
		8 41	*d*	57	3·95	56	5·78								
		9 29	*e*	58	3·88	53·7	5·69								
		10 38	*f*	59	3·81	52·6	5.59								
80	RAPID.	53 28	*b*					Two Horses.	7 passengers, and 2 ton, = *c. q. lb.* 49 2 1	do.	14	14	do.	do.	
		53 58	*c*	30	7·50	253	11·00								
		54 26	*d*	28	8.03	280·8	11·79								
		54 55	*e*	29	7·76	301	11·38								
		55 24	*f*	29	7·76	292·3	11·38								
81	RAPID.	22 05	*b*					do.	do.	fav. light	do.	do.	do.	do.	
		22 30½	*c*	25	8·82	337·3	12·94								
		22 55½	*d*	25	9·00	355·8	13·20								
		23 20½	*e*	25	9·00	356·5	13·20								
		23 46	*f*	25½	8·82	351·2	12·94								
82	RAPID.	36 25	*b*					do.	do.	do.	do.	do.	do.	do.	
		36 44	*c*	19	11·84	482	17·37								
		37 03½	*d*	19½	11·54	483·2	16·92								
		37 23½	*e*	20	11·25	461	16·50								
		37 44	*f*	20½	10·93	434·5	16·09								

TABLE I. CONTINUED.—THE RAPID (FIRST SET.)

83	RAPID.	55 26 57 32 58 35 59 38 40½	*b* *c* *d* *e* *f*	66 63 63 64½	3·41 3·57 3·57 3·60	47 44 43·5 41	5·00 5·24 5·24 5·28	Two Men.	do.	do.	do.	do.	do.	do.	do.	
84	RAPID.	30 06½ 30 27 30 47½ 31 08 31 28½	*b* *c* *d* *e* *f*	20½ 20½ 20½ 20½	10·93 10·93 10·93 10·93	420 372 380·8 374·8	16·09 16·09 16·09 16·09	Two Horses.	7 passengers, and 1 ton, = *c. q. lb.* 29 2 1	fav. strng	do.	do.	do.	do.	do.	
85	RAPID.	40 45 41 11 41 35½ 42 00½ 42 26½	*b* *c* *d* *e* *f*	26 24½ 25 26	8·65 9·18 9·00 8·65	302·3 300 294·2 300	12·69 13·47 13·20 12·69	do.	do.	do.	do.	12⅛	12⅛	do.	do.	
86	RAPID.	55 32 56 00 56 28 56 56 57 25½	*b* *c* *d* *e* *f*	28 28 28 29½	8·03 8·03 8·03 7·59	234·6 242·2 261·3 250·6	11·79 11·79 11·79 11·19	do.	do.	do.	do.	do.	do.	do.	do.	
87	RAPID.	6 18 7 16½ 8 12½ 9 11 10 08	*b* *c* *d* *e* *f*	58½ 56 58½ 57	3·84 4·02 3·84 3·95	45·2 45·7 41·7 43·8	5·64 5.89 5·64 5·78	One Horse. Boy leading	do.	do.	do.	do.	do.	do.	do.	
88	RAPID.	27 45 28 46 29 42 30 40 31 36½	*b* *c* *d* *e* *f*	61 56 58 56½	3·69 4·02 3·88 3·93	56·8 45·1 42 42	5·41 5·90 5·69 5·84	Two Men.	do.	fav. light	do.	do.	do.	do.	do.	
89	RAPID.	51 21 51 46 52 10½ 52 36 53 01	*b* *c* *d* *e* *f*	25 24½ 25½ 25	9·00 9·18 8·82 9·00	263·6 264·4 248 255	13·20 13·47 12·94 13·20	Two Horses.	7 passengers, = *c. q. lb.* 9 2 1	do.	12¼	9	do.	do.		

TABLE II.—THE ZEPHYR (FIRST SET.—36 *Experiments*).

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing (hestake-interval).	Miles per Hour.	Tractive Power in lbs.	Feet per Second.	Kind of Tractive Power.	Load.	Wind.	Draught. Bow	Draught. St'rn	Position of Wave.	Variation in Level.	REMARKS. PLACE OF EXPERIMENT, FORTH AND CLYDE CANAL.
		m. s.		sec.	miles	lbs.	feet.								
90	ZEPHYR.	5 03 5 52 6 42 7 33 8 27	*b* *c* *d* *e* *f*	49 50 51 54	4·59 4·50 4·41 4·17	35·5 38·4 41·6 39·1	6·73 6·60 6·47 6·11	Two Horses.	7 passengers, = *c. q. lb.* 9 2 1	fav. light	in. 7	in. 5	not obs.	not obs.	Weight of ZEPHYR, when empty, 2 ton, 2 cwt. 2 qr. 5 lb. Towing-line, 11ft. from bow.
91	ZEPHYR.	16 35 17 00½ 17 26½ 17 54 18 20½	*b* *c* *d* *e* *f*	25½ 26 27½ 26½	8·82 8·65 8·18 8·49	175·5 169 164·6 155·6	12·94 12·69 12·00 12·45	do.	do.	do.	do.	do.	do.	do.	do.
92	ZEPHYR.	28 50½ 29 15 29 39 30 03 30 27	*b* *c* *d* *e* *f*	24½ 24 24 24	9·18 9·38 9·38 9·38	202 188·7 181·2 175·6	13·47 13·75 13·75 13·75	do.	do.	do.	do.	do.	do.	do.	do.
93	ZEPHYR.	39 10½ 39 27 39 44 40 01 40 18	*b* *c* *d* *e* *f*	17½ 17 17 17	12·86 13·24 13·24 13·24	347 343·8 349 349	18·86 19·41 19·41 19·41	do.	do.	do.	do.	do.	do.	do.	do.

TABLE II. CONTINUED.—THE ZEPHYR (FIRST SET.)

94	Zephyr.	39 20	*b*	19	11·84	357·5	17.37	do.	7 passengers, and 1 ton, = *c. q. lb.* 29 2 1	do.	8¼	7¼	do.	do.	
		39 39	*c*	18	12·50	360	18·33								
		39 57	*d*	18	12·50	372·8	18·33								
		40 15	*e*	18	12·50	361	18 33								
		40 33	*f*												
95	Zephyr.	47 04	*b*	24½	9·18	237·4	13·47	do.	do.	do.	do.	do.	do.	do.	
		7 28½	*c*	23½	9.57	230·5	14·04								
		47 52	*d*	25	9·00	211	13·20								
		48 17	*e*	23½	9·57	222·7	14·04								
		48 40	*f*												
96	Zephyr.	1 15½	*b*	61½	3·66	36·5	5·37	One Horse. Boy leading.	do.	do.	do.	do.	do.	do.	
		2 17	*c*	57½	3·91	42·7	5·74								
		3 14½	*d*	59	3·81	34·9	5·59								
		4 13½	*e*	64½	3·49	31·5	5·12								
		5 18	*f*												
97	Zephyr.	13 59½	*b*	53	4·25	47	6·23	One Horse. Boy riding.	do.	do.	do.	do.	do.	do.	
		14 52½	*c*	53	4·25	46	6·23								
		15 45½	*d*	53½	4·21	38	6·17								
		16 38	*e*	54	4·17	39	6·11								
		17 32	*f*												
98	Zephyr.	47 23½	*b*	18½	12·16	370	17·84	Two Horses.	7 passengers, & 1t. 6 cwt. = *c. q. lb.* 35 2 1	do.	9¼	7¾	do.	do.	Zephyr, with 1 ton, 6 cwt. and 7 passengers, nearly equal to the weight of the Rapid and 7 passengers.
		47 42	*c*	18½	12·16	370·8	17·84								
		48 00	*d*	19	11·84	360	17.37								
		48 19½	*e*	18	12·16	369·2	17·84								
		48 38	*f*												
99	Zephyr.	55 14	*b*	23½	9·57	250·8	14·04	Two Horses.	7 passengers, & 1t. 6 cwt. = *c. q. lb.* 35 2 1	fav. light.	in. 9	in. 7½	not obs.	not obs.	A barge passed, 56m. 40s.
		57 37½	*c*	24	9·38	227·4	13·75								
		56 01½	*d*	24	9·18	223	13·47								
		56 26	*e*	25	9.00	224·7	13.20								
		56 51	*f*												
100	Zephyr.	2 01	*b*	31	7·14	138·5	10·48	do.	do.	do.	do.	do.	do.	do.	
		2 32½	*c*	31	7·14	152·5	10·48								
		3 04	*d*	29	7·59	167·2	11·19								
		3 33½	*e*	30	7·50	156·9	11·00								
		4 03½	*f*												
101	Zephyr.	12 14½	*b*	53	4·21	45·5	6 17	do.	do.	do.	do.	do.	do.	do.	
		13 08	*c*	55	4·09	45·2	6·00								
		14 03	*d*	55	4·09	40	6·00								
		14 58	*e*	55	4·09	41·1	6·00								
		15 53	*f*												
102	Zephyr.	34 22	*b*	19½	11·54	410·4	16·92	do.	7 passengers, and 2 tons, = *c. q. lb.* 49 2 1	do.	10	9	do.	do.	
		34 41½	*c*	18½	12·16	391·5	17·84								
		35 00	*d*	19½	11·54	456·4	16·92								
		35 19½	*e*	19½	11·54	345·2	16·92								
		35 39	*f*												
103	Zephyr.	57 49	*b*	25	9·00	272	13·20	do.	do.	fav. very light	do.	do.	do.	do.	
		58 14	*c*	25	9·00	243·6	13·20								
		58 39	*d*	26	8·65	240 2	12·69								
		59 05	*e*	26	8·65	250·2	12·69								
		59 31	*f*												
104	Zephyr.	1 27	*b*	23	9·78	317·7	14·35	do.	do.	do.	do.	do.	do.	do.	
		1 50	*c*	23	9·78	281·2	14·35								
		2 13	*d*	22⅓	10·00	274·8	14·67								
		2 35½	*e*	22⅓	10·00	252·9	14·67								
		2 58	*f*												
105	Zephyr.	13 31½	*b*	52	4·33	44·2	6 35	do.	do.	do.	do.	do.	do.	do.	
		14 23½	*c*	49	4·59	55·4	6 73								
		15 12½	*d*	52½	4·29	45·4	6·29								
		16 05	*e*	53	4·25	47·4	6·23								
		16 58	*f*												
106	Zephyr.	18 49	*b*	55	4·09	54·1	6·00	Two Horses.	7 passengers, and 3 ton, = *c. q. ld.* 39 2 1	do.	do.	do.	do.	do.	
		19 44	*c*	56	4·02	50·9	5·89								
		50 40	*d*	56	4·02	47·8	5·89								
		51 36	*e*	55½	4·05	48·8	5·89								
		52 31½	*f*												
107	Zephyr.	3 09	*b*	61	3·69	82·3	5·41	do.	do.	do.	12	11	do.	do.	Stern drawn foremost.
		4 10	*c*	60½	3·72	76·4	5·45								
		5 10½	*d*	60	3·75	69·7	5·50								
		6 10⅔	*e*	60	3·75	65·8	5·50								
		7 10½	*f*												

TABLE II. CONTINUED.—THE ZEPHYR (FIRST SET).

108	ZEPHYR.	10 11	*b*	19	11·84	149 8	17·37	Two Horses.	7 passengers, and 3 ton = *c. q. lb.* 69 2 1	fav. light	in 12	in. 11	not obs.	not obs.	
		10 30	*c*	19½	11·54	434·2	16·92								
		10 49½	*d*	19½	11 54	418·4	16·92								
		11 09	*e*	19	11 84	407·4	17 37								
		11 23	*f*												
109	ZEPHYR.	20 58	*b*	27	8·33	272·3	12·22	do.	do.	do.	do.	do.	do.	do.	
		21 25	*c*	26	8 65	262·7	12·69								
		21 51	*d*	27	8 33	299·5	12 22								
		22 18	*e*	27	8·33	291·3	12·22								
		22 45	*f*												
110	ZEPHYR.	29 41	*b*	27	8·33	293 0	12·22	do.	do.	do.	do.	do.	do.	do.	
		30 08	*c*	25	9·00	295·7	13·20								
		30 33	*d*	26	8·65	283·5	12 69								
		30 59	*e*	26	8 65	306·5	12·69								
		31 25	*f*												
111	ZEPHYR.	20 12½	*b*	21½	10·47	441·1	15·35	do.	7 passengers, and 1½ ton, = *c. q. lb* 94 2 1	do.	13¾	12¾	do.	do.	
		20 34	*c*	21	10·71	418·2	15·71								
		20 55	*d*	21	10·71	406·4	15·71								
		21 16	*e*	20½	10·97	423·4	16·09								
		21 36½	*f*												
112	ZEPHYR.	33 36	*b*	28½	7·90	275·0	11·58	do.	do.	do.	do.	do.	do.	do.	
		34 04½	*c*	27½	8·18	321·0	12·00								
		34 32	*d*	27	8·33	351·0	12·22								
		34 59	*e*	28	8·03	377·	11·79								
		35 27	*f*												
113	ZEPHYR.	42 54	*b*	55	4·09	59·8	6·00	do.	do.	do.	do.	do.	do.	do.	
		43 49	*c*	53	4·25	59·8	6·23								
		44 42	*d*	51	4·41	62·7	6·47								
		45 33	*e*	51	4·41	57·6	6·47								
		46 24	*f*												
114	ZEPHYR.	34 41	*b*	18	12·50	401·0	18·33	do.	7 passengers, & 1 13cwt. = *c. q. lb.* 42 2 1	do.	9¾	8½	do.	do.	1 ton 13cwt. made the ZEPHYR and 7 passengers nearly equal to the VELOCITY, with 7 passengers.
		34 59	*c*	19	11·84	384 0	17·37								
		35 18	*d*	19	11·84	375·6	17·37								
		35 37	*e*	18	12·50	372 7	18·33								
		35 55	*f*												
115	ZEPHYR.	17 03	*b*	23	9·78	291 5	14·35	do.	do.	do.	do.	do.	do.	dur. run. bow elev. 11′	
		17 26	*c*	22½	0·00	271·0	14·67								
		17 48½	*d*	23	19·78	267·0	14 38								
		18 11½	*e*	22	10·23	269·4	15·00								
		18 33½	*f*												
116	ZEPHYR.	58 18	*b*	47	4·79	67·1	7·02	do.	do.	do.	do.	do.	do.		Bubble vibrating a little.
		59 05	*c*	47	4·79	59·1	7 02								
		59 52	*d*	48	4·79	53·5	6 88								
		0 40	*e*	48½	4·64	69 9	6 80								
		1 28½	*f*												
117	ZEPHYR.	8 52	*b*	63	3·57	37·8	5·24	Two Horses.	7 passengers,& 1t. 13 cwt.= *c. q. lb.* 12 2 1	fav. light	in. 9¾	in. 8½	not obs.		
		9 55	*c*	60	3·75	39·9	5·50								
		10 55	*d*	57	3·95	50 2	5·78								
		11 52	*e*	55	4·09	42·0	6·00								
		12 47	*f*												
118	ZEPHYR.	19 52	*b*	18	12·50	414·5	18 33	do.	do.	do.	do.	do.	do.	dur. run. bow elev. 27′	
		20 10	*c*	18½	12·16	386·3	17·84								
		20 28	*d*	18½	12·16	372·0	17·84								
		20 47	*e*	19	11·84	372·0	17·37								
		21 06	*f*												
119	ZEPHYR.	38 52	*b*	23	9·78	302 6	14.35	do.	do.	do.	11¼	7¼	do.	do. do. elev 7½	Weight shifted forward.
		39 15	*c*	22½	10·00	270·8	14.67								
		39 37	*d*	22¼	10·00	528·3	14.67								
		40 00	*e*	23	9·78	258·6	14.35								
		40 23	*f*												
120	ZEPHYR.	51 20	*b*	24	9·38	230··	13.75	do.	do.	do.	8¼	10¼	do.	do. do. elev. 15½	do. aft.
		51 44	*c*	23½	9·57	259·2	14.04								
		52 07½	*d*	22¼	10·00	236·7	14.67								
		52 30	*e*	23	9·78	250·0	14.35								
		52 53	*f*												
121	ZEPHYR.	10 25	*b*	22	10·23	328·8	15·00	do.	do.	do.	9½	8½	do.	do. do. dep. 20′	Weight distributed equally.
		10 47	*c*	21½	10·47	311·2	15·35								
		11 08	*d*	20½	10·97	317·3	16·09								
		11 29	*e*	21½	10·47	283·0	15·35								
		11 50	*f*												

TABLE II. CONTINUED.—THE ZEPHYR (FIRST SET).

122	ZEPHYR.	12 06½	*b*	25½	8·82	230·2	12·94	do.	do.	do.	do.	do.	do.	do. elev. 22′	
		12 32	*c*	25	9·00	241·8	13·20								
		12 57	*d*	27	8·33	237·1	12·22								
		13 24	*e*	26	8·65	238·6	12·69								
		13 50	*f*												
123	ZEPHYR.	21 18	*b*	23½	9·57	257·5	14·04	do.	do.	do.	do.	do.	do.	do. do. elev. 22½	
		21 41½	*c*	24½	9·18	253·0	13·47								
		22 06	*d*	24	9·38	256·7	13·75								
		22 30	*e*	23	9·78	245·2	14·35								
		22 53	*f*												
124	ZEPHYR.	7 17	*b*	24	9·38	246·0	13·75	do.	do.	do.	8	10	do.	do. do. elev. 26′	Weight shifted aft.
		8 15	*c*	25	9 00	253·6	13·20								
		9 10½	*d*	24	9·38	259·2	13·75								
		10 04	*e*	23	9·78	249·0	14·35								
		11 01	*f*												
125	ZEPHYR.	36 01½	*b*	23½	9 57	254·5	14·04	do.	do.	do.	16	11½	7¼	do. do. elev. 32′	Weight shifted forward.
		36 23	*c*	25½	8·82	243 0	12·94								
		36 44½	*d*	25½	8·82	253·2	12·94								
		37 06	*e*	25½	8·82	259·2	12·94								
		37 27	*f*												

TABLE III.—THE LARK (31 *Experiments*.)

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
No. of Experiment.	Boat's Name.	Instant of passing the Stake.	Stakes 110 yards apart.	Time of passing the stake interval.	Miles per Hour.	Tractive power in lbs.	Feet per Second.	Tractive power.	Load.	Wind.	Draught.		Position of Wave.	Variation of Level.	REMARKS.
											Bow	St'rn			PLACE OF EXPERIMENT, FORTH AND CLYDE CANAL.
		ms. se.		sec.	miles.	lbs.	feet.								
126	LARK.	1 18½	*b*	17½	12·86	386·0	18·86	Two Horses.	7 passengers, = *c. q. lb.* 9 2 1	fav. light	in. 10¼	in. 10¼	not obs.	dur. run. bow elev. 25½	Weight of LARK, when empty, 3 ton 3 cwt. 1qr. 4lb.
		1 36	*c*	21	10·71	355·0	15·71								
		1 57	*d*	20½	10·97	337·0	16·09								
		2 17½	*e*	20½	10·97	317·7	16·09								
		2 38	*f*												
127	LARK.	27 05	*b*	25	9·00	256·5	13·20	do.	do.	do.	do.	do.	do.	do. do. elev. 15′	
		27 30	*c*	24	9·38	253·6	13·75								
		27 54	*d*	24½	9·18	256·1	13·47								
		28 18½	*e*	23½	9·57	264·6	14·04								
		28 42	*f*												
128	LARK.	41 04	*b*	49	4·59	64·7	6·73	do.	do.	fav. stronger than last.	do.	do.	do.	do. do. level	
		41 53	*c*	52	4·33	55·9	6·35								
		42 45	*d*	50	4·50	56·5	6·60								
		43 35	*e*	54½	4·13	46·5	6·06								
		44 30½	*f*												
129	LARK.	52 44	*b*	69	3·26	26·0	4·78	do.	do.	not steady.	do.	do.	do.	do.	
		53 53	*c*	69	3·26	23·3	4·78								
		55 02	*d*	70	3·21	20·8	4·71								
		53 12	*e*	73	3·08	28·6	4·52								
		57 25	*f*												
130	LARK.	18 30	*b*	18	12·50	396·0	18·33	do.	7 passengers, and 5 cwt. = *c. q. lb.* 14 2 1	fav. light	10½	10½	do.	do. do. elev. 27′	5 cwt. made the LARK and 7 passengers nearly equal to the RAPID, and 7 passengers.
		18 48	*c*	20	11·25	368·7	16·50								
		19 08	*d*	19½	11·54	370·6	16·92								
		19 27½	*e*	20½	10·97	364·5	16·09								
		19 47	*f*												
131	LARK.	27 02½	*b*	24	9·38	279·7	13·75	do.	do.	do.	do.	do.	do.	do. do. clev. 17′	
		27 26½	*c*	23½	9·57	270·8	14·04								
		27 50	*d*	23½	9·57	251 5	14·04								
		28 13½	*e*	22½	10·00	265·0	14·67								
		28 36	*f*												
132	LARK.	36 51½	*b*	56½	3·98	13·8	5·84	do.	do.	fav. stronger than last.	do.	do.	do.	do. do. elev. 3′	
		37 47	*c*	56	4·02	50·1	5·89								
		38 43	*d*	52	4·33	43·4	6·35								
		39 35	*e*	48	4·69	39·1	6·88								
		40 33	*f*												
133	LARK.	0 38	*b*	19	11·84	393·4	17·37	do.	7 passengers, and 12 cwt. = *c. q. lb.* 21 2 1	do.	11½	11½	do.	do. do. elev. 29′	12cwt. made the LARK, and 7 passengers nearly equal to the VELOCITY, and 7 passengers.
		0 57	*c*	19½	11·54	372·3	16·92								
		1 16½	*d*	20½	10·97	363·6	16·09								
		1 36	*e*	20	11·25	366·8	16·04								
		1 56	*f*												

TABLE III. CONTINUED.—THE LARK.

134	Lark.	8 46	*b*	23½	9·57	286·2	14·04	do.	do.	fav. light	do.	do.	do.	do. do. elev. 19′	
		9 09½	*c*	24	9·38	280·2	13·75								
		9 33½	*d*	23½	9·56	278 5	14·04								
		9 57	*e*	23½	9·57	265·6	14·04								
		10 20½	*f*												
135	Lark.	22 55	*b*	58	3·88	34·6	5·69	Two Horses.	7 passengers, and 12 cwt.= *c. q. lb.* 21 2 1	fav. fresh breeze.	in. 11½	in 11	not obs.	dur. run. bow elev. 1½′	
		23 33	*c*	57	3·95	35·2	5·78								
		24 30	*d*	57	3·95	45·5	5·78								
		25 27	*e*	57½	3·91	39·2	5·74								
		26 24½	*f*												
136	Lark.	52 54	*b*	19½	11·53	404·8	16·92	do.	7 passengers, and 1 ton, = *c. q. lb.* 29 2 1	do.	11¾	11¾	do.	do. do. elev. 24	
		52 [illegible]3½	*c*	19	11·84	398·3	17·37								
		53 12½	*d*	19½	11·54	382·3	16·92								
		53 32	*e*	19½	11·54	388·0	16·92								
		53 51	*f*												
137	Lark.	2 18	*b*	24½	9·18	295·0	13·47	do.	do.	do.	do.	do.	do.	do. do. elev. 13′	
		2 43	*c*	24	9·38	295·2	13·75								
		3 07	*d*	24	9·38	293·1	13·75								
		3 31	*e*	22	10·23	293·5	15·00								
		3 53	*f*												
138	Lark.	14 45	*b*	55	4·09	37·0	6·00	do.	do.	do.	do.	do.	do.	do. do. level.	
		15 40	*c*	59	3·81	36·5	5·59								
		16 39	*d*	58	3·88	35·6	5·69								
		17 37	*e*	57	3·95	36·0	5·78								
		18 34	*f*												
139	Lark.	27 52	*b*					do.	do.	do.	do.	do.	do.		Boat drifted with the wind.
		30 30	*c*												
		32 55	*d*												
		34 10	*e*												
		36 03	*f*												
140	Lark.	44 45	*b*	20	11·25	435·0	16·50	do.	7 passengers, and 2 ton = *c. q. lb.* 49 2 1	do.	13½	13½	do.	do. do. elev. 29′	
		45 05	*c*	21	10·71	415·0	15·71								
		45 26	*d*	21	10·71	393·0	15·71								
		45 47	*e*	20½	10·97	387·0	16·09								
		46 07½	*f*												
141	Lark.	57 35½	*b*	25½	8·82	388·7	12·94	do.	do.	do.	do.	do.	do.	do. do. elev. 26′	
		58 01	*c*	25	9·00	334·0	13·20								
		58 26	*d*	25½	8·82	329·0	12·94								
		58 [illegible]1½	*e*	25½	8·82	334·7	12·94								
		59 17	*f*												
142	Lark.	7 17	*b*	58	3 88	46·2	5·69	do.	do.	do.	do.	do.	do.	do. do. level.	
		8 15	*c*	55½	4·05	48·2	5·95								
		9 10½	*d*	53½	4·21	46·6	6·17								
		10 04	*e*	57	3·95	36·1	5·78								
		11 01	*f*												
143	Lark.	36 01½	*b*	21½	10 47	448·7	15·35	do.	7 passengers, and 3 ton, = *c. q. lb.* 69 2 1	do.	14¾	14¾	do.	do. do. elev.	
		36 23	*c*	21½	10·47	422·6	15·35								
		36 44	*d*	21½	10·47	400·0	15·35								
		37 06	*e*	21	10·71	401·0	15·71								
		37 27	*f*												
144	Lark.	46 33	*b*	59	3·81	41·3	3·59	Two Horses.	do.	fav. fresh brze.	in. 14¾	in. 14¾	not obs.	dur. run. bow elev. 3½′	The towing-line dragged along the water a short distance.
		47 32	*c*	57	3·95	56·6	5·78								
		48 29	*d*	59	3·81	49·3	5·59								
		49 28	*e*	58	3·88	34·0	5·69								
		50 26	*f*												
145	Lark.	58 29	*b*	26	8.65	359.2	12.69	do.	do.	do.	do.	do.	do.	do. do. elev. 28′	
		58 55	*c*	26½	8.49	369.3	12.45								
		59 21½	*d*	26½	8.49	354.4	12.45								
		59 48	*e*	26	8.65	359.0	12.69								
		14	*f*												
146	Lark.	41 46	*b*	25	9·00	432.3	13.20	do.	7 passengers, and 4¼ ton,= *c. q. lb.* 94 2 1	fav. very light	16½	16½	do.	do. do. elev. 30′	
		42 11	*c*	25½	8·82	408.0	12.94								
		42 36½	*d*	28½	7·90	380.6	11.58								
		43 05	*e*	31½	7·14	372.1	10.48								
		43 36½	*f*												
147	Lark.	56 05	*b*	62	3·63	47.3	5.32	do.	do.	do.	do.	do.	do.	do. do. level	
		57 07	*c*	63	3·57	43.2	5.24								
		58 10	*d*	63	3·57	56.8	5.24								
		59 13	*e*	61	3·69	45.8	5.41								
		14	*f*												

TABLE III. CONTINUED.—THE LARK.

148	Lark.	9 29½	*b*	31½	7.14	248.5	10 48	do.	do.	do.	do.	do.	do.	do.	
		10 01	*c*	34½	6.52	181.6	9·57							do.	
		10 35½	*d*	33	6.82	195.2	10·00							elev.	
		11 08½	*e*	33½	6.72	176.7	9·85							5'	
		11 41	*f*												
149	Lark.	24 36	*b*												
		25 02	*c*	26	8·65	121 2	12·69								
		25 28	*d*	26	8·65	413·4	12·69	do.	do.	do.	do.	do.	do.	not	
		25 54	*e*	26	8·65	432·4	12·39							obs.	
		26 24	*f*	30	7·50	419·5	11·00								
150	Lark.	12 05½	*b*												
		12 29½	*c*	24	9·38	463·7	13·75							do.	
		12 52	*d*	23½	9·57	456·2	14·04	do.	do.	do.	do.	do.	do.	do.	
		13 14½	*e*	22½	10·00	430·7	14·67							elev.	
		13 37	*f*	22½	10·00	412·0	14·67							45'	
151	Lark.	22 07½	*b*												
		22 34½	*c*	27	8·33	377·5	12·22							do.	
		23 01½	*d*	27	8·33	377·5	12·22							do.	
		23 29	*e*	27½	8·18	402·6	12·00	do.	do.	do.	do.	do.	do.	elev.	
		23 57	*f*	28	8·03	422·0	11·79							37'	
152	Lark.	39 28	*b*												
		39 51	*c*	23	9·78	474·0	14·35							do.	
		40 13½	*d*	22½	10·00	458 2	14·67							do.	
		40 36	*e*	23½	10·00	431·0	14·67	do.	do.	do.	18	15	do.	elev.	Weight shifted forward.
		40 57	*f*	21	10·71	424·7	15·71							34'	
153	Lark.	52 35	*b*												
		53 02½	*c*	27½	8·18	398·3	12·00		7 passengers, and 4¼ ton, = *c. q. lb.* 94 2 1					dar.	
		53 30½	*d*	28	8·03	382·	1·79	Two		fav.	in.	in.	not	run.	
		53 58	*e*	28½	7·90	413·0	1·58	Horses.		light	18	15	obs.	bow	
		54 26	*f*	27	8·03	426·0	1·79							elev.	
														35'	
154	Lark.	6 13½	*b*												
		7 10	*c*	56½	3·98	59·9	5·84							do.	
		8 08	*d*	58	3·88	55·6	5·69	do.	do.	do.	do.	dc.	do.	do.	
		9 08	*e*	60	3·75	44·8	5·50							level.	
		10 11	*f*	63	3·57	40·6	5·24								
155	Lark.	37 53	*b*												
		38 17½	*c*	24½	9·18	444·4	13 47							do.	
		38 40½	*d*	23	3·78	449·3	14·35							do.	
		39 03½	*e*	23	9·78	436·0	14·35	do.	do.	do.	14¾	17¾	do.	elev.	Weight shifted aft.
		39 26½	*f*	23	9·78	422·2	14·35							32'	
156	Lark.	59 03	*b*												
		29 26	*c*	23	9·78	479·0	14·35							do.	
		59 50	*d*	24	9·38	160·5	13·75			fav.				do.	
		12	*e*	22	10·25	149·2	15·00	do.	do.	very	19½	13	do.	elev.	Weight shifted forward.
		35	*f*	23	9·78	139·7	14·35			light				5'. At	Towing-line 5 ft. from the
														rest.	Stern. Dynamometer 5
														depd	ft. 6 in. from the bow.
														4'	

From the Saratoga Sentinel.

HIGHLY IMPORTANT INVENTION.—ELECTRO MAGNETIC ENGINE.

In company with Dr. Steel and several other gentlemen, we called upon Messrs. Davenport and Cook, of this village on Saturday, with a view of examining the Electro Magnetic Engine invented by the senior partner.

The ingenuity, yet simplicity of its construction, the rapidity of its motion, together with the grandeur of the thought that we are witnessing the operations of machinery propelled by that subtle and all pervading principle electricity, combine to render it the most interesting exhibition we have ever witnessed.

Although we shall say something on the subject, it is perhaps impossible to describe this machine by words alone, so as to give more than a faint idea of it to the reader.

It consists of a stationary magnetic circle, formed of disconnected segments. These segments are permanently charged magnets the repelling poles of which are placed contiguous to each other. Within the circle stands the motive wheel, having the projecting galvanic magnets, which revolve as near the circle as they can be brought without actual contact. The galvanic magnets are charged by a battery, and when so charged magnetic attraction and repulsion are brought into requisition, in giving motion to the wheel—the poles of the galvanic magnets being changed more than a thousand times, per minute.

Having in its construction but one wheel, revolving with no friction except from its own shaft, and from the wires connecting it with the galvanic battery, the latter of which can scarcely be said to impede the motion in any degree, the durability of this engine must be almost without limit.

There is no danger to be apprehended from fire or explosion: and we understand it is the opinion of scientific gentlemen who have examined it, that the expense of running this machine will not amount to one fourth as much as that of a steam engine of the same power.

From the time when the Greek philosopher supposed the magnet possessed a soul, its mysterious power has been regarded with increasing interest and attention to the present day. In addition to its utility in the compass, thousands have labored in vain attempts to obtain through its agency a rotary motion. So intense has been the application of some to this subject, that in the attempt they have even lost that elevating attribute of our species, reason. It was reserved for Mr. Davenport to succeed where so many had failed.

He commenced his labors more than three years ago, and prosecuted them under the most discouraging and unfavorable circumstances—sustained by a constitutional perseverance and a clear conviction of ultimate success. He obtained the first rotary motion in July, 1834,; since which time he has devoted his whole attention to improvements

in his machine. During this period it has passed through five different modifications, and is now brought to such a state of simplicity and perfection (having apparently the fewest possible number of parts) that the proprietors consider no further important alterations desirable, except in the due proportions of the different magnets, in which they are daily improving.

We were shown a model in which the motive wheel was 5½ inches diameter, which elevated a weight of *twelve pounds*. And to illustrate the facilities for increasing the power of this engine, another model was exhibited to us with a motive wheel of eleven inches in diameter, which elevated a weight of *eighty eight pounds*. Although these models have been for some time in progress, and we have occasionally been permitted to examine them, we have waited till the present period when the practicability of obtaining a rapid and unlimited increase of power seems to be placed beyond a doubt, before expressing an opinion, or calling the public attention to the subject.

If this engine answers the expectations of the inventor, (and we believe no one can assign a *reason* why it should not, it is destined to produce the greatest revolution in the commercial and mechanical interests which the world has ever witnessed. We may consider the period as commencing when machinery in general will be propelled by power concentrated upon the plan of this engine; when the vessels of all commercial nations will be guided to their point of destination and urged forward in their course by the same agent triumphantly contending against winds and tides, with the silent sublimity of unseen but irresistible power.

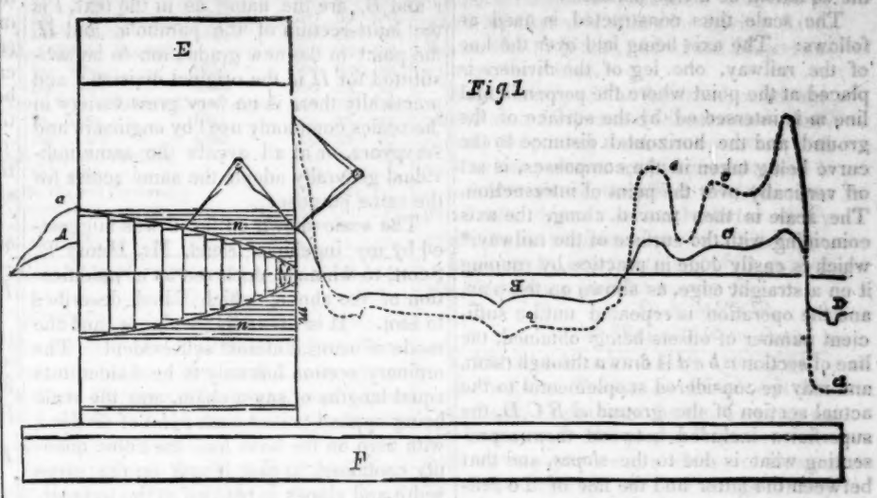
The prophetic ken of science is happily exhibited by Dr. Lardner, in his treatise on the Steam Engine. His far seeing genius seems to have anticipated the invention of which we are speaking. "Philosophy," said he, "already directs her finger at sources of inexhaustible power in the phenomena of electricity and magnetism, and many causes combine to justify the expectation that we are on the eve of mechanical discoveries still greater than any which have yet appeared: and that the steam engine itself, with the gigantic powers conferred upon it by the immortal Waft, will dwindle into insignificance in comparison with the hidden powers of nature still to be revealed, and that the day will come when that machine, which is now extending the blessing of civilization to the most remote skirts of the globe, will cease to have existence except in the page of history."

From the integrity, perseverance, and mechanical skill of RANSOM COOK, Esq., who has himself made an important invention in this engine, and has undertaken to bring the same into use, we anticipate a speedy introduction of its merits to the public. It is hoped that he may prove a second Livingston to another Fulton. He is about to depart for our large cities, in some of which he contemplates the erection of powers for mechanical purposes.

Several individuals, agents of Messrs. DAVENPORT and COOK, are also departing with models to secure letters patent in the different countries in Europe and South America.

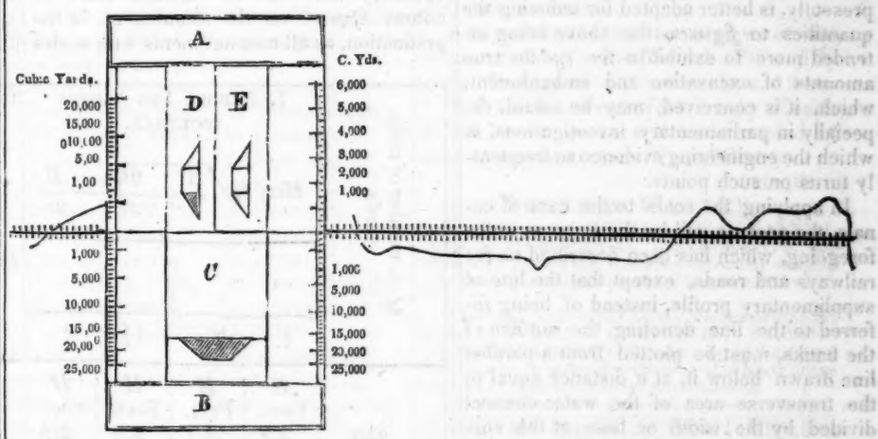
Plate 3.

Fig. 1



E, Vertical Scale 200 feet to 1 inch, Base 30 feet, Slope 1½ to 1. F, Straight edge.

Fig. 2.

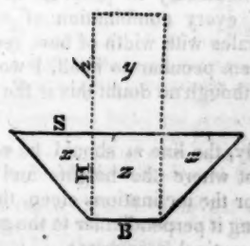


A, Vertical Scale 100 feet to 1 inch, Base 30 feet, Slope 1½ to 1. B, Quantities given in cubic yards for lengths of 1 chain. C, Middle and Slopes together. D, Slopes without Middle. E, Middle without Slopes.

A METHOD OF REPRESENTING BY DIAGRAM AND ESTIMATING THE EARTHWORK IN EXCAVATIONS AND EMBANKMENTS. BY JOHN JAMES WATERSTON, A. INST. C. E.

The object of this paper is to describe the construction of two sets of scales, by the use of one of which a section may be plotted, representing the actual amount of material contained in any cutting or embankment, of the relation of which to each other a mere profile of the country, from not showing the contents of the side slopes, gives but an imperfect idea, even to professional men, particularly if the heights and depths be at all considerable, or if the slopes be not uniform; and by the other a computation of the quantities may be made, almost by the arithmetical process of addition only.

The principle on which the first operation is effected, is to accumulate the contents of the slopes x, x, into the rectangle y, over the middle part z in cutting, and under it in embanking, which is done by



the formula $h = \frac{r}{B} H^2$, wherein B denotes the base or width of the excavation or embankment, as the case may be, H its depth, r the ratio of the slope, or of S to H, and h the height of the rectangle y, substituted in lieu of the slopes x, x. From this theorem, the scale shown on the drawing (plate No. III, fig. 1.) is constructed, the heights H being marked on the vertical line m, and the supplemental heights h on the lines n, n, at right angles to it; and if

a curve be drawn through the extremities of the latter lines, it will, as is evident from the equation, be a true parabola.

The scale thus constructed is used as follows. The axis being laid over the line of the railway, one leg of the dividers is placed at the point where the perpendicular line m is intersected by the surface of the ground, and the horizontal distance to the curve being taken in the compasses, is set off vertically over the point of intersection. The scale is then moved along, the axis coinciding with the surface of the railway,* which is easily done in practice by running it on a straight edge, as shown on the plan, and the operation is repeated until a sufficient number of offsets being obtained, the line of section $a\ b\ c\ d$ is drawn through them, and may be considered supplemental to the actual section of the ground $A\ B\ C\ D$, the superficies included between them representing what is due to the *slopes*, and that between the latter and the line of the railway what is due to the *middle*, while the product of the whole area, multiplied by the base or width of roadway, gives the total cubical content of the cutting or embankment. But the scale to be described presently, is better adapted for reducing the quantities to *figures*, the above being intended more to exhibit to the *eye* the true amounts of excavation and embankment, which, it is conceived, may be useful, especially in parliamentary investigations, in which the engineering evidence so frequently turns on such points.

In applying the scale to the case of canals, the process will be the same as in the foregoing, which has been described as for railways and roads, except that the line of supplimentary profile, instead of being referred to the line denoting the surface of the banks, must be plotted from a parallel line drawn below it, at a distance equal to the transverse area of the water channel divided by the width or base at that surface; and, indeed, in the cuttings for railways this will also have to be done to an extent, to allow for the ballasting. And with respect to an objection that may be taken to the number of the proposed scales it will be necessary to possess, in consequence of every combination of *original* vertical scales with width of base requiring one of them peculiar to itself, I would remark that though no doubt this is the case,†

* Strictly, the line m should be *vertical*, but, except where the heights and depths are great or the inclinations steep, the error from holding it perpendicular to the gradient is not of practical importance.

† If only the parabolic curve, and the tangential line m at its apex, be marked permanently on the scales, and the perpendiculars n, n, be traced on it as the occasion requires, one scale will be enough for every purpose, the division of the tangent m (by which, and the curve, the lines n, n are also determined) being effected by the use one point being thus gained, all the others of course follow by equidistances. When the latus-rectum is large, the parabola is more obtuse, and the lines n, n, better defined.

of the formula $H' = H\sqrt{\frac{lr}{B}}$, in which H, r and B, are the name as in the text, l is the latus-rectum of the parabola, and H' the point in the new graduation to be substituted for H in the original division; and practically there is no very great variety in the scales commonly used by engineers and surveyors, or at all events the same individual generally adopts the same scales for the same purposes.

The scale shown on fig. 2 was suggested by my ingenious friend, Mr. Henry E. Scott, to whom it occurred as a modification of the above, which I had described to him. It is exceedingly simple, and the mode of using it almost self-evident. The ordinary section has only to be divided into equal lengths of say a chain, and the scale being applied to it at each point of division, with zero on the base line, the cubic quantity contained in that length on the given width and slopes is read off at the intersection with the surface of the ground; after which the content of the whole cutting or embankment is obtained by simply adding those figures together. The degree of accuracy that will be afforded must of course depend on the minuteness of the graduation, as all measurements with scales do; and if it appears impossible to go to *feet and inches* by this one, unless the section be very large, it should be borne in mind that the result given is final, and that (to say nothing of the liability to error in casting) any portion of inaccuracy that may be in it is not subject to increase by multiplication, which, if considered, may be found to affect to as great an extent quantities calculated from the *primary* dimensions.

The construction of the scale is derived from the easily investigated formula $H = \sqrt{\frac{B^2}{4r^2} + \frac{9A}{r}} - \frac{B}{2r}$, in which A is the transverse area in square yards, the other letters expressing the same elements as before; or if Q denote the cubic content in yards, the equation $H = \sqrt{\frac{B^2}{4r^2} + \frac{9Q}{22r}} - \frac{B}{2r}$ is adapted for calculating the quantities in lengths of a chain each. This will give the total content, but as, when estimates are in progress, the angle the ground will stand at may not have been precisely ascertained, and perhaps have to be corrected afterwards, it is sometimes desirable to keep the slopes separate for a time from the middle or rectangular part, in which

Q = number of cubic yards.

	I. Middle and Slopes together. $H = \sqrt{\frac{B^2}{4r^2} + \frac{9Q}{22r}} - \frac{B}{2r}$				II. Middle without Slopes. $H = Q\frac{9}{22B}$	III. Slopes without Middle. $H = \sqrt{\frac{9Q}{22r}}$			
	r					r			
	½	1	1½	2		½	1	1½	2
	H Feet.	H Feet.	H Feet.	H Feet.	Feet.	H Feet.	H Feet.	H Feet.	H Feet.
250	3.2	3.1	3.0	2.8	3.4	14.3	10.1	8.2	7.1
500	6.2	5.7	5.4	4.8	6.8	20.2	14.3	11.6	10.1
750	9.0	8.1	7.5	6.8	10.2	24.8	17.5	14.3	12.4
1000	11.4	10.2	9.3	8.6	13.6	28.6	20.2	16.5	14.3
1500	16.1	13.9	12.5	11.5	20.4	35.0	24.8	20.2	17.5
2000	20.4	17.3	15.4	14.1	27.3	40.5	28.6	23.3	20.2
2500	24 3	20.3	18.0	16.3	34.1	45.2	32.0	26.1	22.7
3000	27.9	23.1	20.3	18.4	40.9	49.6	35.0	28.6	24.8
4000	34.6	28.1	24.5	22.1	54.5	57.2	40.5	33.0	28.6
5000	40.7	32.6	28.2	25.3	68.2	64.0	45.2	36.9	32 0
6000	46.2	36.8	31.7	28.3			49.6	40.4	35.0
7000	51.4	40.3	34.8	31.1			53.5	43.7	37.9
8000	56.3	44.1	37.8	33.6			57.2	46.7	40.5
9000	60.9	47.5	40.5	36.1			60.6	49.6	42.9
10,000	65.3	50.7	43.2	38.3			64.0	52.2	45.2
11,000		53.7	45.6	40.5				54.8	47.3
12,000		56.6	47.9	42.6				57.2	49.6
13,000		59.3	50.3	44.6				59·7	51.4
14,000		62.0	52.5	46.5				61.9	53.5
15,000		64.7	54.7	48.4				64.0	55.4
16,000			56.7	50.2					57.3
17,000			58.7	52.0					59.1
18,000			60.7	53.7					60.8
19,000			62.6	55.3					62.4
20,000			64.5	56.9					64.0
21,000				58.5					
22,000				60.1					
23,000				61.6					
24,000				63.0					
25,000				64.4					

case the scale may be conveniently graduated on the one edge for the middle portion by $H = Q \frac{9}{22B}$, and on the other, for the slopes, by $H = \sqrt{\frac{9Q}{22r}}$. The above table has been constructed by way of specimen from these formulæ, and shows the heights which, measured on the scales, give the points corresponding with the cubic quantities in the first column, the length in all cases being taken as one chain, the width or base as thirty feet, and the slopes as stated; but the quantities for other lengths, widths, and slopes are, as I need hardly say, in the simple proportion of the variation in any one of the dimensions.

List of subscribers to the **Railroad Journal,** that have paid, (continued.)

Alva Kimball, city New York, Jan. 1, 1838
General Fleming, " " " 1, 1838
D. Rogers, Newburgh, " Sept. 1, 1837
A. Falls & Co., " " April 1, 1837
Aaron Burt, Syracuse, " Jan. 1, 1838
C. J. Blauvett, Blauvettville, N. Y., July 1, 1837
H. C. Seymour, Deposit, N. Y. Jan. 1, 1838
John Brooks, Bridgeport, Con., Jan. 1, 1838
A. G. Ralston & Co., Philadelphia, Pa., Jan. 1, 1838
A Subscriber in Baltimore, Md., Aug. 1, 1838
C. A. Hagner, Washington, D. C., Jan. 1, 1838
Geo. McLeod, Washington, D. C., Jan. 1, 1837
John Steele, Raleigh, N. C., Jan. 1, 1838
A. J. Comstock, Adrian, Mich., " 1, 1838
E. R. Blackwell, Mt. Clemens, Mich., Jan. 1, 1838
D. Scott, Columbus, Ohio, Jan. 1, 1838
University of Georgia, Athens, Geo., June 10, 1836

PHILADELPHIA STOCK MARKET.
April 7th

	Price of shares	Offered	Asked
RAILROAD STOCKS			
New-Castle and Frenchtown	25	29	29½
Do loan, 5½ per cent	100	99	101
Wilmington and Susquehanna	50	33	36
Camden and Amboy, shares,	100	131	131½
Do loan, 6's 1836	100	110	120
Danville and P. shares	50	25	35
Norristown, do	50	21	25
Do 6 per cent loan	100	119	120
Valley Railroad	7½	1	3
Westchester do	50	20	28
Minehill do	50	57	59
N. L. and Penn. Tp. do	40	34½	35
Philadelphia and Trenton do	100	121	123
West Philadelphia Railroad	50	20	30
Harrisburg and Lancaster	50	46	48
Cumberland	25	15	20
Beaver Meadow	50	57	57½
MISCELLANEOUS STOCKS			
North American Coal Company	25	12	14
Steam Bt. Sts. Columbian,	100	18	22
Exchange Stock	100	70	80
Arcade	100	55	75
Theatres—Chestnut street	600	625	675
——Walnut street	280	175	220
——Arch street	500	325	375
Gas Company	100	95	100
CANAL STOCKS.			
Schuylkill Navigation, shares	50	154	156
Do loans, 5 1845	100	98	100
Do do 1855	100	100	101
Do do 5½ 1837	100	98	100
Lehigh Coal and Navigation	50	76	77
Do loan, 6 1833	100	97	98
Do do 6 1839	100	97	98
Do do 6 1844	100	99	100
Do do 5 1840	100	96	97½
Union Canal, shares	200	180	190
Do loan, 1836	100	83	86
Do do 1840	100	85	90
Chesap'k & Delaware Canal, shares	200	20	40
Do loan, 1837	100	60	67
Do do 1840	100	60	67
Delaware and Hudson,	100	69	69½
Do loan	100	95	100
Louisville and Portland	100	112½	117
Convertible 6 per cent. loans,	100	110	120
Sandy and Bever	100	60	80
Morris Canal	100	75	78

NEW-YORK AND ALBANY RAILROAD.

NOTICE.—The books will be open for subscribers to the capital stock of the New-York and Albany Railroad Company, on the 25th, 26th and 27th days of April, from 10 A. M. to 2 P. M. on each day, at the following places:

At the office of the New-York and Harlem Railroad, No. 18 Wall street, New-York.

At the Mechanics' and Farmers' Bank, Albany.

At the Farmers' Bank, Troy.

Also, at such places as the Commissioners, residing in the counties of Westchester, Putnam and Dutchess, may appoint at the times herein specified.

On Monday, 8th May, in Eastchester,
Tuesday, the 9th, in White Plains,
Wednesday, 10th, in Bedford,
Thursday, 11th, in New Castle,
Friday, 12th, in South East,
Saturday, 13th, in Paterson,
Monday, 15th, in Rawlings,
Tuesday, 16th, in Dover,
Wednesday, 17th, on Dover Plains,
Thursday, 18th, in Armenia.

COMMISSIONERS.

Gideon Lee,	Benson McGown,
Lewis Morris,	Samuel Chewer,
Taber Belden,	Charles Henry Hall,
John Harris,	Thomas W. Olcott,
Albro Atkin,	Ebenezer Foster,
Francis Ficket,	J. Van Schoonhoven,
Isaac Adriance,	Stephen Warren,

Jeremiah Anderson.

Shares $100 each, $5 to be paid at the time of subscribing. 14-3t

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TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its engravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance.* The first number will be ready for delivery early in April—Subscriptions are solicited.

ARCHIMEDES WORKS.

(100 North Moore street, N. Y.)

New-York, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size. Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice

4—v1f H. R. DUNHAM & CO.

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers having formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S Durfee & Co., will be done by the new firm, the same superintendant and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be promptly attended to, and ropes will be shipped to any port in the United States.

12th month, 12th, 1836. Hudson, Columbia County State of New-York.

ROBT. C. FOLGER.

33—tf. GEORGE COLEMAN,

MACHINE WORKS OF ROGERS KETCHUM AND GROSVENOR, Paterson, New Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and despatch

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles, Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron, Springs; Boxes and Bolts for Cars.

COTTON WOOL AND FLAX MACHINERY,

Of all descriptions and of the most improved Patterns, Style and Workmanship.

Mill Gearing and Millwright work generally; Hydraulic and other Presses; Press Screws; Callendors; Lathes and Tools of all kinds, Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR

Patterson, New-Jersey, or 60 Wall street, N. Y

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ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order IRON CASTINGS for Gearing Mills and Factories of every description

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

AN ELEGANT STEAM ENGINE AND BOILERS, FOR SALE.

THE Steam Engine and Boilers, belonging to the STEAMBOAT HELEN, and now in the Novelty yard, N Y. Consisting of one Horizontal high pressure Engine, (but may be made to condense with little additional expense) 36 inches diameter, 10 feet stroke, with latest improved Piston Valves, and Metalic packing throughout.

Also, four Tubular Boilers, constructed on the English Locomotive plan, containing a fire surface of over 600 feet in each, or 2500 feet in all—will be sold cheap. All communications addressed (post paid) to the subscriber, will meet with due attention

HENRY BURDEN.

Troy Iron Works, Nov. 15, 1836. 4—tf

NOTICE TO CONTRACTORS. WESTERN RAILROAD.

PROPOSALS will be received at the office of the Western Railroad Corporation, in Springfield, until the 10th May, for the grading and masonry of the second and third divisions of the road, extending from East Brookfield to Connecticut river, at Springfield—a distance of 35 miles.

Plans, Profiles, &c. will be ready for examination after the first of May. W. H. SWIFT,

Resident Engineer.

Worcester, Mass., April 1, 1837. 14-6t

AMES' CELEBRATED SHOVELS, SPADES, &c:

300 dozens Ames' superior back-strap Shovels
150 do do do plain do
150 do do do caststeel Shovels & Spades
150 do do Gold-mining Shovels
100 do do plated Spades
50 do do socket Shovels and Spades.

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed,) manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.

No. 2 Liberty street, New-York

BACKUS, AMES & CO.

No. 8 State street, Albany

N. B—Also furnished to order, Shapes of every description, made from Salsbury refined Iron v4—tf

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads.

No. 264 Elizabeth street, near Bleecker street, New-York.

RAILROAD COMPANIES would do well to examine these Cars: a specimen of which may be seen on that part of the New-York and Harlaem Railroad now in operation J25tf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

*** The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent.

Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes. (1J23am) H. BURDEN.

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build, on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the national road in Illinois, at sundry points. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Henniker, N. H. Across the Soutiegan river, at Milford, N. H. Across the Connecticut river, at Haverhill, N. H. Across the Contoocook river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesse river, at Squakihill, Mount Morris, New-York. Across the White River, at Hartford Vt. Across the Connecticut River, at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Canaraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie, Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the FIRMEST WOODEN BRIDGE ever built in America.

Notwithstanding his present engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms. MOSES LONG.

Rochester, Jan. 13th, 1837. 4—y

TO MANUFACTURERS OF HYDRAULIC CEMENT.

PROPOSALS will be received by the subscriber, on the part of the James River and Kanawka Companies, for the delivery on the wharf, at the city of Richmond, Va., of Fifty Thousand Bushels of Hydraulic Cement. The amount called for must be furnished in quantities of about six thousand, bushels per month, commencing on the first of April and ending on the first of November next.

To avoid future litigation, it is to be understood, on making the proposals, that the bushel shall weigh seventy pounds NETT, and that the Cement shall be delivered in good ordder, and packed in tight casks or barrels.

Proposals will also be received for furnishing fifty thousand bushels, at any convenient point on the navigable waters of James River, or the north branch of James River, where the materials for its manufacture has been discovered.

Persons familiar with the preparation of the Cement, would do well to examine the Counties of Rockbridge and Botetourt, with a view to the establishment of works for the supply of the western end of the line; and a contract for the above quantities will be made with them before they commence operations.

As there will be required on the line of the James River and Kanawka Improvement, in the course of the present and next year, not less than half a million of bushels of this Cement, and some hundred thousand bushels more in the progress of the work towards the west, contractors will find it to their interest to furnish the article on terms that lead to future engagements.

Proposals to be directed to the subscriber at Richmond, Va CHARLES ELLET, Jr,

Chief Engineer of the J. R. and Ka. Co.

February 20th, 1837. 9 6t

CROTON AQUEDUCT.

NOTICE.—Sealed Proposals will be received by the Water Commissioners of the city of New-York, until the 22d day of April next, at 3 o'clock, P. M., at their office in the city of New-York, and until the 24th day of April, at 9 o'clock, P. M., at the office of their Engineer in the village of Sing Sing, for constructing a Dam across the Croton River, for the Excavation, Embankment, Back Filling, Foundation and Protection Walls; for an Aqueduct Bridge at Sing Sing, three Tunnels, several large and small culverts, and an Aqueduct of stone and brick masonry, with other incidental work, for that portion of the Croton Aqueduct which extends from the Dam on the Croton to Sing Sing, being between eight and nine miles in length

The prices for the work must include the expense of materials necessary for the completion of the same, according to the plans and specifications that will be presented for examination, as hereinafter mentioned.

The Work to be completed by the first day of October, 1839.

Security will be required for the performance of contracts—and propositions should be accompanied by the names of responsible persons, signifying their assent to become sureties. If the character and responsibilities of those proposing, and the sureties they shall offer, are not known to the Commissioners or Engineers, a certificate of good character, and the extent of their responsibility, signed by the first judge or clerk of the county in which they severally reside, will be required.

No transfer of contracts will be recognised.

Plan of the several structures and specifications of the kind of materials and manner of construction, may be examined at the office of the Commissioners, in the city of New-York, from the 10th to the 14th, inclusive, of April next. The line of Aqueduct will be located, and the map and profile of the same, together with the plans and specifications above mentioned, will be ready for examination at the office of the Engineer, at the village of Sing Sing, on the 15th day of April next, and the Chief or Resident Engineer will be in attendance to explain the plans, &c., and to furnish blank propositions.

Persons proposing for more work than they wish to contract for, must specify the quantity they desire to take

The full names of all persons that are parties to any proposition, must be written out in the signature for the same.

The parties to the propositions which may be accepted, will be required to enter into contracts immediately after the acceptance of the same.

The undersigned reserve to themselves the right to accept or reject proposals that may be offered for the whole or any part of the above described work, as they may consider the public interest to require.

STEPHEN ALLEN,
CHARLES DUSENBURY,
SAUL ALLEY,
WILLIAM W FOX,
} Water Commissioners.

JOHN B. JERVIS,

Chief Engineer, New-York Water Works.

New-York, February 28, 1837. 10 8t